WHAT IS CLAIMED IS:

1. A radio network comprising: core node connected to a wired network;

relay nodes each relaying at least one of a down-link data packet initially transmitted from said core node and an up-link data packet directed toward said core node;

a terminal station capable of transmission and reception of data packet with both of said core node and said relay node,

said relay node having total path loss to be minimum at least one of between relay nodes includes in a relay route of said data packet and between said relay node and said core node is selected.

2. A radio network comprising:

core nodes connected to a wired network; relay nodes each relaying at least one of a down-link data packet initially transmitted from said core node and an up-link data packet directed toward said core node;

a terminal station capable of transmission and reception of data packet with both of said core node and said relay node,

said relay node relaying said up-link data packet to other one of up-link relay node and said core node when the up-link data packet addressed to own node is receibed and relaying a down-link data packet to at least one down-link relay node when

the down-link data packet address to the own node is received.

3. A radio network as set forth in claim 2, wherein said core node transmits a route setting packet including a sender node identification information, an up-link receiver side relay node and a metric indicative of an amount providing criteria for selecting said up-link receiver side node, said relay node sets a sum of a metric contained in said route setting packet and a path loss between a node transmitted said route setting packet and a node receiving said route setting packet as an update metric, when the currently obtained update metric is smaller than any of update metric corresponding to route setting packets received in the past, a new route setting packet containing said currently obtained update metric as new metric is relayed to other relay node, a sender node information indicative of the currently obtained route setting packet is set in the up-link receiver side relay node of own node, and information of said receiver side relay node is set in an up-link receiver side node information contained in new route setting packet.

4. A radio network as set forth in claim 2, wherein said core node transmits a route setting packet including a sender node identification information, an up-link receiver side relay

node and a metric indicative of an amount providing criteria for selecting said receiver side node, said relay node uses a weighting coefficient having a value of zero to one upon updating of said metric when said route setting packet is received, decides a new upcate metric calculated by adding the metric contained in said route setting packet multiplied by said weighting coefficient and the metric to be newly added multiplied by said weighting coefficient and the metric to be newly added multiplied by a value calculated by sibtracting said weighting coefficietn from one.

5. A radio network as set forth in claim 4, wherein the metric contained in said rout

e setting packet to be received by said relay node contains a metric generated based on a path loss and a metric generated based on hop count indicating number of relay nodes included in said relay route.

6. A radio network as set forth in claim 5, wherein said relay node updates the first metric using a first weighting coefficient and updates the second metric using a second weighting coefficient among metric contained in the route setting packet upon reception of said route setting packet, relays new route setting packet to taking the first and second

update metrics as new metric corresponding to the currently received route setting packet when said first update metric is smaller than any of the first update metrics received in the past and when the first update metric is the same as the minimum value of the first update metric corresponding to the route setting packet received in the past and all of the second update metric corresponding to the route setting packet received in the past and having the minimum first update metric are greater than the second update metric corresponding to the route setting packet currently received, the sender node information indicated by said route setting packet is set as an up-link receiver side relay node, and the up-link receiver side relay node information set in the up-link receiver side relay node information contained in the new route setting packet.

7. A radio network as set forth in claim 6, wherein said first metric is generated on the basis of the hop count and said second metric is generated on the basis of the path loss.

8. A radio network as set forth in claim 6, wherein, upon making judgment of large and small of said two kinds of metrics, metrics falls within a predetermined range is judged as the same metric.

9. A radio network as set forth in claim 6, wherein, upon updating the metric, 0.5 is used as a first weighting coefficient and 0.5 is used as a second weighting coefficient.

10. A radio network as set forth in claim 6, wherein, upon updating said metric, 0 is used as a second weighting coefficient.

11. A radio network comprising: a relay node which forgets all of update metrics corresponding to the route setting packets received in the past and relays a new route setting packet taking the update metric corresponding to the currently received route setting packet as new metric, when a sender node identification information contained in the received route setting packet matches a current up-link receiver side relay node of own node.

12. A radio network as set forth in claim 3, wherein, after updating the metric contained in the received route setting packet, the sender node of the minimum metric among update metrics stored in the past including the currently updated update metric is determined, and a new route setting packet taking the update metric corresponding to the determined sender node as new metric, is relayed to other relay node when the sender node does not match with at least the current up-link receiver side relay node of own node.

13. A radio network as set forth in claim 7, wherein, after updating the metric contained in the received route setting packet, sender nodes having the first metric to be the minimum metric among update metrics stored, are selected and the sender node having the second metric to be minimum metric among said update metrics for the selected sender nodes is decided, and a new route setting packet taking the update metric corresponding to the determined sender node as new metric, is relayed to other relay node when the sender node does not match with at least the current up-link receiver side relay node of own node.

14. A radio network as set forth in claim 3, wherein said relay node makes reference to the up-link receiver side relay node information contained in said route setting packet upon receiving the route setting packet, and records information of the node transmitted said route setting packet in a relay node list when the up-link receiver side node information indicates own node.

15. A radio network as set forth in claim 3, wherein said core node makes reference to the up-link receiver side relay node information contained in said route setting packet upon receiving the route setting packet, and records information

of the node transmitted said route setting packet in a relay node list when the up-link receiver side node information indicates own node.

16. A radio network as set forth in claim 14, wherein information relating to update metrics corresponding to the route setting packets received in the past are erased after expiration of a given period.

17. A radio network as set forth in claim 14, wherein said core node sets said metric contained in said route setting packet to zero.

18. A radio network as set forth in claim 14, wherein the path loss is predicted from a reception power of the received route setting packet.

19. A radio network as set forth in claim 14, wherein said relay node transmits the up-link data packet to said up-link receiver side relay node upon reception of the up-link data packet transmitted from one of said terminal station and other relay nodes.

20. A radio network as set forth in claim 19, wherein each

relay node stores the sender side relay information contained in the up-link date packet transmitted to the own node in the relay node list.

21. A radio network as set forth in claim 14, wherein said relay node relays a down-link data packet to at least a part of nodes contained in said relay node list upon relaying the down-link data packet.

22. A radio network as set forth in claim 21, wherein the information of the nodes contained in said relay node list is erased after expiration of the predetermined period.

23. A radio network as set forth in claim 21, wherein the down-link data packet contains the terminal station information, said terminal station performs reception process of the down-link data packet when the terminal station information identifies the own station as checking the terminal station information contained in the down-link data packet transmitted from the adjacent relay node.

24. A radio network as set forth in claim 21, wherein said relay node selects up-link data packet having higher reception quality when the same up-link data packet is received from a

plurality of sender side relay nodes, for relaying.

25. A radio network as set forth in claim 21, wherein said core node selects up-link data packet having higher reception quality when the same up-link data packet is received from a plurality of sender side relay nodes, for relaying.

26. A radio network as set forth in claim 21, wherein either of said relay node or said core node performs mazimal ratio combining reception upon receiving the same up-link data packets from a plurality of the sender side relay nodes.

27. A radio network as set forth in claim 3, wherein said route setting packet is transmitted at a constant transmission power in all of the relay nodes and the core nodes.

28. A radio network as set forth in claim 3, wherein said up-link data packet is controlled the transmission power for constant reception power or constant reception quality in the relay node or reception side relay node.

29. A radio network as set forth in claim 3, wherein said down-link data packet is controlled the transmission power for

constant reception power or constant reception quality in the relay node or reception side relay node.

30. A radio network as set forth in claim 1, wherein a radio frequency band to be used in relaying to be performed between said core node and said relay node and between said relay nodes and a radio frequency band to be used in access transmission to be performed between said core node and said terminal station and between said relay node and said terminal station, are different, and the radio frequency band to be used in relaying is higher than the radio frequency band to be used in said access transmission.

31. A radio network as set forth in claim 1, wherein each of said core node and said relay node has a plurality of directional antennas, each of said plurality of directional antennas is variable of transmitting direction, each node controls transmitting direction of the directional antennas toward either of said core node and said relay node located adjacent to said node.

32. A radio network as set forth in claim 31, wherein either of said core node and said relay node uses a non-directional antenna upon transmission of said route setting packet, and

uses said directional antenna upon relaying of the data packet.

33. A radio network comprising: cores node connected to a wired network; relay nodes each relaying at least one of a down-link data packet transmitted from said core node and an up-link data packet directed toward said core node;

a terminal station capable of transmission and reception of data packet with both of said core node and said relay node, a radio frequency band to be used in relaying to be performed between said core node and said relay node and between said relay nodes and a radio frequency band to be used in access transmission to be performed between said core node and said terminal station and between said relay node and said terminal station, are different, and the radio frequency band to be used in relaying is higher than the radio frequency band to be used in said access transmission.

34. A radio network as set forth in claim 33, wherein each of said core node and said relay node has a plurality of directional antennas, each of said plurality of directional antenna is variable of transmitting direction, each node controls transmitting direction of the directional antennas their own toward either of said core node and said relay node located adjacent to said node.

35. A radio network as set forth in claim 34, wherein either of said core node and said relay node uses a non-directional antenna upon transmission of said route setting packet, and uses said directional antennas upon relaying of the data packet.

36. A relay node relaying at least one of a down-link data packet initially transmitted from said core node and an up-link data packet directed toward said core node, and capable of communication with a terminal station, comprising:

antennas for access transmission; antenna for relaying; radio system for access transmission; and radio system for relaying,

a radio frequency band to be used in relaying to communicate with said core node and a radio frequency band to be used in access transmission to communicate with said terminal station, are different, and the radio frequency band to be used in relaying is higher than the radio frequency band to be used in said access transmission.

37. A relay node relaying at least one of a down-link data packet initially transmitted from said core node and an up-link data packet directed toward said core node, and capable of communication with a terminal station, selecting relay

nodes for making a total path loss in a relay route of said data packet minimum from own node to the core node

38. A relay node relaying at least one of a down-link data packet initially transmitted from said core node and an up-link data packet directed toward said core node, and capable of communication with a terminal station, relaying the up-link data packet to other one of up-link relay node and said core node when the up-link data packet addressed to own node is recived and relaying a down-link data packet to at least one down-link relay node when the down-link data packet address to the own node is received.

39. A relay node as set forth in claim 38, wherein a route setting packet including a sender node identification information, an up-link receiver side relay node and a metric indicative of an amount providing criteria for selecting said up-link receiver side node from said core node or other relay node, said relay node sets a sum of a metric contained in said route setting packet and a path loss between a node transmitted said route setting packet and a node receiving said route setting packet as an update metric, when the currently obtained update metric is smaller than any of update metric corresponding to route setting packets received in the past, a new route setting

packet containing said currently obtained update metric as new metric is relayed to other relay nodes, a sender node information indicative of the currently obtained route setting packet is set in the up-link receiver side relay node of own node, and information of said receiver side relay node is set in an up-link receiver side node information contained in new route setting packet.

40. A relay node as set forth in claim 38, wherein a route setting packet including a sender node identification information, an up-link receiver side relay node and a metric indicative of an amount providing criteria for selecting said receiver side node from said core node or other relay node, said relay node uses a weighting coefficient having a value of zero to one upon updating of said metric when said route setting packet is received, decides a new update metric calculated by adding the metric contained in said route setting packet multipkied by said weighting coefficient and the metric to be newly added multiplied by a value calculated by subtracting said weighting coefficient from one.

41. A relay node as set forth in claim 40, wherein the metric contained in said route setting packet to be received by own node contains a metric generated based on a path loss and a

metric generated based on hop count indicating number of relay nodes included in said relay route.

42. A relay node as set forth in claim 41, which updates the first metric using a first weighting coefficient and updates the second metric using a second weighting coefficient among metric contained in the route setting packet upon reception of said route setting packet, relays new route setting packet to taking the first and second update metrics as new metric corresponding to the currently received route setting packet when said first update metric is smaller than any of the first update metrics received in the past and when the first update metric is the same as the minimum value of the first update metric corresponding to the route setting packet received in the past and all of the second update metric corresponding to the route setting packet received in the past and having the minimum first update metric are greater than the second update metric corresponding to the route setting packet currently received, the sender node information indicated by said route setting packet is set as an up-link receiver side relay node, and the up-lonk receiver side relay node information set in the up-link receiver side relay node information contained in the new route setting packet.

43. A relay node as set forth in claim 42, wherein said first metric is generated on the basis of the hop count and said second metric is generated on the basis of the path loss.

44. A relay node as set forth in claim 42, wherein, upon making judgment of large and small of said two kinds of metrics, metrics falls within a predetermined range is judged as the same metric.

45. A relay node as set forth in claim 42, wherein, upon updating the metric, 0.5 is used as a first weighting coefficient and 0.5 is used as a second weighting coefficient.

46. A relay node as set forth in claim 42, wherein, upon updating said metric, 0 is used as a second weighting coefficient.

47. A relay node as set forth in claim 39, which forgets all of update metrics corresponding to the route setting packets received in the past and relays a new route setting packet taking the update metric corresponding to the currently received route setting packet as net metric, when a sender node identification information contained in the received route setting packet matches a current up-link receiver side relay node of own node.

48. A relay node as set forth in claim 39, wherein, after

updating the metric contained in the received route setting packet, the sender node of the minimum metric among update metrics stored in the past including the currently updated update metric is determined, and a new route setting packet taking the update metric corresponding to the determined sender node as new metric, is relayed to other relay node when the sender node does not match with at least the current up-link receiver side relay node of own node.

49. A relay node as set forth in claim 43, wherein, after updating the metric contained in the received route setting packet, sender nodes having the first metric to be the minimum metric among update metrics stored, are selected, the sender node having the second metric to be minimum metric among said update metrics for the selected sender nodes is decided, and a new route setting packet taking the update metric corresponding to the determined sender node as new metric, is relayed to other relay node when the sender node does not match with at least the current up-link receiver side relay node of own node.

50. A relay node as set forth in claim 39, wherein said relay node makes reference to the up-link receiver side relay node information contained in said route setting packet upon receiving the route setting packet, and records information

of the node transmitted said route setting packet in a relay node list when the up-link receiver side node information indicates own node.

51. A relay node as set forth in claim 50, wherein information relating to update metrics corresponding to the route setting packets received in the past are erased after expiration of a given period.

52. A relay node as set forth in claim 50, wherein the path loss is predicted from a reception power of the route setting packet received by the relay node.

53. A relay node as set forth in claim 50, wherein said relay node transmits the up-link data packet to said up-link receiver side relay node upon reception of the up-link data packet transmitted from one of said terminal station and other relay node.

54. A relay node as set forth in claim 53, wherein each relay node stores the sender side relay information contained in the up-link data packet transmitted to the own node in its relay node list.

55. A relay node as set forth in claim 50, wherein said relay node relays a down-link data packet to at least a part of nodes contained in said relay node list upon relaying the down-link data packet.

56. A relay node as set forth in claim 55, wherein the information of the nodes contained in said relay node list is erased after expiration of the predetermined period.

57. A relay node as set forth in claim 55, wherein the down-link data packet contains the terminal station information, said terminal station performs reception process of the down-link data packet when the terminal station information identifies the own station as checking the terminal station information contained in the down-link data packet transmitted from the adjacent relay node.

58. A relay node as set forth in claim 56, wherein said relay node selects up-link data packet having higher reception quality when the same up-link data packet is received from a plurality of sender side relay nodes, for relaying.

59. A relay node as set forth in claim 55, which performs maximal ratio combining reception upon receiving the same

up-link data packets from a plurality of the sender side relay nodes.

60. A relay node as set forth in claim 39, wherein said route setting packet is transmitted at a constant transmission power in all of the relay nodes and the core nodes.

61. A relay node as set forth in claim 39, wherein said up-link data packet is controlled the transmission power for constant reception power or constant reception quality in the relay node or reception side relay node.

62. A relay node as set forth in claim 39, wherein said down-link data packet is controlled the transmission power for constant reception power or constant reception quality in the relay node or reception side relay node.

63. A relay node as set forth in claim 37, wherein a radio frequency band to be used in relaying to be performed between said core node and said relay node and between said relay nodes and a radio frequency band to be used in access transmission to be performed between said core node and said terminal station and between said relay node and said terminal station, are different, and the radio frequency band to be used in relaying

is higher than the radio frequency band to be used in said access transmission.

64. A relay node as set forth in claim 37, wherein each of said core node and said relay node has a plurality of directional antenna, each of said plurality of directional antenna is variable of transmitting direction, each node controls transmitting direction of the directional antennas toward either of said core node and said relay node located adjacent to said node.

65. A relay node as set forth in claim 64, which uses a non-directional antenna upon transmission of said route setting packet, and uses said directional antenna upon relaying of the data packet.

66. A relay node relaying at least one of a down-link data packet transmitted from said core node and an up-link data packet directed toward said core node, and capable of communication with a terminal station,a radio frequency band to be used in relaying to be performed between said core node and said relay node and between said relay nodes and a radio frequency band to be used in access transmission to be performed between said core node and said terminal station and between said relay node

and said terminal station, are different, and the radio frequency band to be used in relaying is higher than the radio frequency band to be used in said access transmission.

67. A relay node as set forth in claim 66, wherein each of said core node and said relay node has a plurality of directional antenna, each of said plurality of directional antenna is variable of transmitting direction, each node controls transmitting direction of the directional antennas toward either of said core node and said relay node located adjacent to said node.

68. A relay node as set forth in claim 67, which uses a non-directional antenna upon transmission of said route setting packet, and uses said directional antennas upon relaying of the data packet.

69. A core node capable of transmission and reception of data packet with either a relay node that perform radio relaying and a terminal station, and connected to a wired network, comprising: an antenna for access transmission; an antenna for relaying; a radio system for access transmission;

a radio system for relaying; and

a signal distributor connected to a wired backbone

network,a radio frequency band to be used in relaying to communicate said relay node and a radio frequency band to be used in access transmission to communicate with said terminal station, are different, and the radio frequency band to be used in relaying is higher than the radio frequency band to be used in said access transmission.

70. A core node connected to a wired network, being relayed at least one of a down-link data packet transmitted from own node and an up-link data packet directed toward own node, and capable of transmission and reception of data packet with a terminal station, and transmitting a route setting packet including a metric indicative of an amount providing criteria for selecting an up-link receiver side relay node an up-link receiver side relay node information and a receiver side relay node, to said relay node.

71. A core node as set forth in claim 70, wherein said metric contained in said route setting packet is set to zero.

72. A core node as set forth in claim 70, wherein the metric contained in said route setting packet to be received by own node contains a metric generated based on a path loss and a metric generated based on hop count indicating number of relay

nodes included in said relay route.

73. A radio network as set forth in claim 70, wherein the up-link receiver side relay node information contained in said route setting packet is made reference to upon receiving the route setting packet and records information of the node transmitted said route setting packet in a relay node list when the up-link receiver side node information indicates own node.

74. A core node as set forth in claim 73, wherein the information of the nodes contained in said relay node list is erased after expiration of the predetermined period.

75. A core node as set forth in claim 70, which selects the up-link data packet having higher reception quality when the same up-link data packet is received from a plurality of sender side relay nodes, for relaying.

76. A core node as set forth in claim 70, wherein either of said relay node or said core node performs maximal ratio combining reception upon receiving the same up-link data packets from a plurality of the sender side relay nodes.

77. A core node as set forth in claim 70, wherein said route

setting packet is transmitted at a constant transmission power in all of the relay nodes and the core nodes.

78. A core node as set forth in claim 70, wherein said down-link data packet is controlled the transmission power for constant reception power or constant reception quality in the relay node or reception side relay node.

79. A core node as set forth in claim 70, wherein a radio frequency band to be used in relaying to communicate with said relay node and a radio frequency band to be used in access transmission to communicate with said terminal station, are different, and the radio frequency band to be used in relaying is higher than the radio frequency band to be used in said access transmission.

80. A core node as set forth in claim 70, wichi has a plurality of directional antennas, each of said plurality of directional antennas is variable of transmitting direction, and controls transmitting direction of the directional antennas their own toward either of said relay node located adjacent.

81. A core node as set forth in claim 80, which uses a non-directional antennas upon transmission of said route

setting packet, and uses said directional antenna upon relaying of the data packet.

82. A core node connected to a wired network, being relayed at least one of a down-link data packet transmitted from own node and an up-link data packet directed toward own node, and capable of transmission and reception of data packet with a terminal station, a radio frequency band to be used in relaying to communicate with said relay node and a radio frequency band to be used in access transmission to communicate with said terminal station, are different, and the radio frequency band to be used in relaying is higher than the radio frequency band to be used in said access transmission.

83. A core node as set forth in claim 82, which has a plurality of directional antennas, each of said plurality of directional antennas is variable of transmitting direction, and controls transmitting direction of the directional antennas toward either of said relay node located adjacent.

84. A core node as set forth in claim 83, which uses a non-directional antenna upon transmission of said route setting packet, and uses said directional antennas upon relaying of the data packet.

85. A relaying method for a radio network including a core node connected to a wired network, relay nodes each relaying at least one of a down-link data packet transmitted from said core node and an up-link data packet directed toward said core node, and a terminal station capable of transmission and reception of data packet with both of said core node and said relay node, comprising the step of: selecting said relay node having total transmission loss to be minimum at least one of between relay nodes includes in a relay route of said data packet and between said relay node and said core node.

86. A relaying method for a radio network including a core node connected to a wired network, relay nodes each relaying at least one of a down-link data packet transmitted from said core node and an up-link data packet directed toward said core node, and a terminal station capable of transmission and reception of data packet with both of said core node and said relay node, comprising steps of:

relaying said up-link data packet to other one of up-link relay node and said core node when the up-link data packet addressed to own node is received and relaying a down-link data packet to at least one down-link relay node when the down-link data packet address to the own node is received.

87. A relaying method as set forth in claim 86, wherein said core node transmits a route setting packet including a sender node identification information, an up-link receiver side relay node and a metric indicative of an amount providing an indicia for selecting said receiver side node, said relay node sets a sum of a metric contained in said route setting packet and a transmission loss between a node transmitted said route setting packet and a node receiving said route setting packet as an update metric, when the currently obtained update metric is smaller than any of update metric corresponding to route setting packets received in the past, a new route setting packet containing said currently obtained update metric as new metric is relayed to other relay node, a sender node information indicative of the currently obtained route setting packet is set in the up-link receiver side relay node, and information of said receiver side relay node is set in an up-link receiver side node information contained in new route setting packet.

88. A relaying method as set forth in claim 86, wherein said core node transmits a route setting packet including a sender node identification information, an up-link receiver side relay node and a metric indicative of an amount providing an indicia for selecting said receiver side node,

said relay node uses a weighting coefficient having a value of zero to one upon updating of said metric when said route setting packet is received, multiplies said weighting coefficient with the metric contained in said route setting packet, multiplying the metric to be added by a value calculated by subtracting said weighting coefficient from one and adding products from both multiplication to setting a resultant value as update metric.

89. A relaying method as set forth in claim 88, wherein the metric contained in said route setting packet to be received by said relay node contains a metric generated based on a path loss and a metric generated based on hop number indicating number of relay nodes included in said relay route.

90. A relaying method as set forth in claim 89, wherein said relay node updates the first metric using a first weighting coefficient and updates the second metric using a second weighting coefficient among metric contained in the route setting packet upon reception of said route setting packet, relays new route setting packet to taking the first and second update metrics as new metric corresponding to the currently received route setting packet when said first update metric is smaller than any of the first update metrics received in

the past and when the first update metric is the same as the minimum value of the first update metric corresponding to the route setting packet received in the past and all of the second update metric corresponding to the route setting packet received in the past and having the minimum first update metric are greater than the second update metric corresponding to the route setting packet currently received, the sender node information indicated by said route setting packet is set in the up-link receiver side relay node, and the receiver side relay node information thus set us set in the up-link receiver side relay node information contained in the new route setting packet.

91. A relaying method as set forth in claim 90, wherein said first metric is generated on the basis of the hop number and said second metric is generated on the basis of the path loss.

92. A relaying method as set forth in claim 90, wherein, upon making judgment of large and small of said two kinds of metrics, metrics falls within a predetermined range is judged as the same metric.

93. A relaying method as set forth in claim 90, wherein, upon updating the metric, 0.5 is used as a first weighting coefficient and 0.5 is used as a second weighting coefficient.

94. A relaying method as set forth in claim 90, wherein, upon updating said metric, 0 is used as a second weighting coefficient.

95. A relaying method comprising: a relay node which forgets all of update metrics corresponding to the route setting packets received in the past and relays a new route setting packet taking the update metric corresponding to the currently received route setting packet as net metric, when a sender node identification information contained in the received route setting packet matches a current up-link receiver side relay node.

96. A relaying method as set forth in claim 87, wherein, after updating the metric contained in the received route setting packet, the sender node of the minimum metric among update metrics stored in the past including the currently updated update metric is determined, and a new route setting packet taking the update metric corresponding to the determined sender core as new metric, is relayed to other relay node when the sender node does not match with at least the current up-link receiver side relay node.

97. A relaying method as set forth in claim 91, wherein, after updating the metric contained in the received route setting

packet, the sender node having the first metric to be the minimum metric among update metrics stored, is selected, the sender node having the second metric to be minimum metric among said update metrics for the selected sender node and a new route setting packet taking the update metric corresponding to the determined sender core as new metric, is relayed to other relay node when the sender node does not match with at least the current up-link receiver side relay node.

98. A relaying method as set forth in claim 87, wherein said relay node makes reference to the up-link receiver side relay node information contained in said route setting packet upon receiving the route setting packet for recording information of the node transmitted said route setting packet in a relay node list when the up-link receiver side node information indicates own node.

99. A relaying method as set forth in claim 87, wherein said core node makes reference to the up-link receiver side relay node information contained in said route setting packet upon receiving the route setting packet for recording information of the node transmitted said route setting packet in a relay node list when the up-link receiver side node information indicates own node.

100. A relaying method as set forth in claim 98, wherein information relating to update metrics corresponding to the route setting packets received in the past are erased after expiration of a given period.

101. A relaying method as set forth in claim 98, wherein said core node sets said metric contained in said route setting packet to zero.

102. A relaying method as set forth in claim 98, wherein the transmission loss is predicted from a reception power of the received route setting packet.

103. A relaying method as set forth in claim 98, wherein said relay node transmits the up-link data packet to said up-link receiver side relay node upon reception of the up-link data packet transmitted from one of said terminal station and other relay node.

104. A relaying method as set forth in claim 103, wherein each relay node stores the receiver side relay information contained in the up-link packet transmitted to the own node.

105. A relaying method as set forth in claim 98, wherein said relay node relays a down-link data packet to at least a part of nodes contained in said relay node list upon relaying the down-link data packet.

106. A relaying method as set forth in claim 105, wherein the information of the nodes contained in said relay node list is erased after expiration of the predetermined period.

107. A relaying method as set forth in claim 105, wherein the down-link data packet contains the terminal station information, said terminal station performs reception process of the down-link data packet when the terminal station information identifies the own station as checking the terminal station information contained in the down-link data packet transmitted from the adjacent relay node.

108. A relaying method as set forth in claim 105, wherein said relay node selects up-link data packet having higher reception quality when the same up-link data packet is received from a plurality of sender side relay nodes, for relaying.

109. A relaying method as set forth in claim 105, wherein said core node selects up-link data packet having higher reception

quality when the same up-link data packet is received from a plurality of sender side relay nodes, for relaying.

110. A relaying method as set forth in claim 105, wherein either of said relay node or said core node performs maximum ratio combined reception upon receiving the same up-link data packets from a plurality of the sender side relay nodes.

111. A relaying method as set forth in claim 87, wherein said route setting packet is transmitted at a constant transmission power in all of the relay nodes and the core nodes.

112. A relaying method as set forth in claim 87, wherein said up-link data packet is controlled the transmission power for constant reception power or constant reception quality in the relay node or reception side relay node.

113. A relaying method as set forth in claim 87, wherein said down-link data packet is controlled the transmission power for constant reception power or constant reception quality in the relay node or reception side relay node.

114. A relaying method as set forth in claim 85, wherein a radio frequency band to be used in relaying to be performed

between said core node and said relay node and between said relay nodes and a radio frequency band to be used in access transmission to be performed between said core node and said terminal station and between said relay node and said terminal station, are different, and the radio frequency band to be used in relaying is higher than the radio frequency band to be used in said access transmission.

115. A relaying method as set forth in claim 851, wherein each of said core node and said relay node has a plurality of directional antenna,

each of said plurality of directional antenna is variable of transmitting direction,

each node controls transmitting direction of the directional antenna their own toward either of said core node and said relay node located adjacent to said node.

116. A relaying method as set forth in claim 115, wherein either of said core node and said relay node uses a non-directional antenna upon transmission of said route setting packet, and uses said directional antenna upon relaying of the data packet.

117. A relaying method for a system including core node connected to a wired network, relay nodes each relaying at least

one of a down-link data packet transmitted from said core node and an up-link data packet directed toward said core node, and a terminal station capable of transmission and reception of data packet with both of said core node and said relay node,

a radio frequency band to be used in relaying to be performed between said core node and said relay node and between said relay nodes and a radio frequency band to be used in access transmission to be performed between said core node and said terminal station and between said relay node and said terminal station, being different, and the radio frequency band to be used in relaying is higher than the radio frequency band to be used in said access transmission.

118. A relaying method as set forth in claim 117, wherein each of said core node and said relay node has a plurality of directional antenna, each of said plurality of directional antenna is variable of transmitting direction, each node controls transmitting direction of the directional antenna their own toward either of said core node and said relay node located adjacent to said node.

119. A relaying method as set forth in claim 118 , wherein either of said core node and said relay node uses a non-directional antenna upon transmission of said route setting

packet, and uses said directional antenna upon relaying of the data packet.

120. A relaying method for a radio network including core nodes connected to a wired network, relay nodes each relaying at least one of a down-link data packet initially transmitted from said core node and an up-link data packet directed toward said core node, and a terminal station capable of transmission and reception of data packet with both of said core node and said relay node, comprising:

step of detecting arrival of a route setting packet including a sender node identification information, an up-link receiver side relay node information and a metric indicative of an amount providing criteria for selecting an up-link receiver side relay node;

step of making judgment whether said up-link receiver side relay node indicates own node or not upon detection of arrival of said route setting packet;

step of recording a node indicated by said sender node identification information contained in said route setting packet in a relay node list when judgment is made that said up-link receiver side information indicates own node;

step of taking a measured path loss upon judgment that said up-link receiver side node relay node information does

not indicative own node, as path loss Ln (n is unique number of a sender node of said route setting packet) between the node transmitting said route setting packet and the own node;

step of reading the metric Mr.n contained in said route setting packet;

step of calculating and storing an update metric from said path loss Ln and said metric Mr.n;

step of comparing said update metric Mn with the update metric corresponding to the route setting packet received in the past for making judgment whether the update metric Mn is minimum;

step of setting said update metric Mn to a metric field contained in a new route setting packet and registering the node indicated by said sender node identification information of the currently arrived route setting packet as said up-link receiver side relay node of own node when said update metric Mn is judged as minimum; and

step of transmitting the new route setting packet containing said metric Mn as a new metric M, sender node identification information indicating identification information of own node and said up-link receiver side relay node information.

121. A relaying method for a radio network including a core

node connected to a wired network, relay nodes each relaying at least one of a down-link data packet initially transmitted from said core node and an up-link data packet directed toward said core node, and a terminal station capable of transmission and reception of data packet with both of said core node and said relay node, comprising:

step of detecting arrival of a route setting packet including a sender node identification information, an up-link receiver side relay node information and a metric indicative of an amount providing criteria for selecting the up-link receiver side relay node;

step of making judgment whether said up-link receiver side relay node indicates own node or not upon detection of arrival of said route setting packet;

step of recording a node indicated by said sender node identification information contained in said route setting packet in a relay node list when judgment is made that said up-link receiver side information indicates own node;

step of taking a measured path loss upon judgment that said up-link receiver side node relay node information does not indicative own node, as path loss Ln (n is unique number of a sender node of said route setting packet) between the node transmitting said route setting packet and the own node;

step of reading the metric Mr.n contained in said route

setting packet;

step of calculating and storing an update metric from said path loss Ln and said metric Mr.n;

step of making judgment whether the sender node identification information contained in the currently received route setting packet matches with the current up-link receiver side relay node of own node or not;

step of forgetting all stored update metrics when the sender node identification information contained in the currently received route setting packet matches with the current up-link receiver side relay node of own node;

step of comparing the update metric corresponding to the route setting packet received in the past and the currently obtained update metric Mn when the sender node identification information contained in the currently received route setting packet does not match with the current up-link receiver side relay node of own node;

step of setting said update metric Mn to a metric contained in a new route setting packet and registering the node indicated by said sender node identification information of the currently arrived route setting packet as said up-link receiver side relay node of own node when all of said update metrics are forgotten or when said update metric Mn is judged as minimum; and

step of transmitting the new route setting packet

containing said metric Mn as a new metric M, sender node identification information indicating identification information of own node and said up-link receiver side relay node information.

122. A relaying method for a radio network including a core node connected to a wired network, relay nodes each relaying at least one of a down-link data packet initially transmitted from said core node and an up-link data packet directed toward said core node, and a terminal station capable of transmission and reception of data packet with both of said core node and said relay node, comprising:

step of detecting arrival of a route setting packet including a sender node identification information, an up-link receiver side relay node information and a metric indicative of an amount providing criteria for selecting an up-link receiver side relay node;

step of making judgment whether said up-link receiver side relay node indicates own node or not upon detection of arrival of said route setting packet;

step of recording a node indicated by said sender node identification information contained in said route setting packet in a relay node list when judgment is made that said up-link receiver side information indicates own node;

step of taking a measured path loss upon judgment that said up-link receiver side node relay node information does not indicative own node, as path loss Ln (n is unique number of a sender node of said route setting packet) between the node transmitting said route setting packet and the own node;

step of reading the metric Mr.n contained in said route setting packet;

step of calculating and storing an update metric from said path loss Ln and said metric Mr.n;

step of comparing said update metric Mn with the updates metric corresponding to the routes setting packet received in the past for determining a sender node m (m is unique number of node) having minimum metric;

step of making judgment whether said sender node m is the same as the current up-link receiver side relay node of own node and $n \neq m$;

step of setting said update metric Mn to a metric field contained in a new route setting packet and registering the node indicated by said sender node m as said up-link receiver side relay node of own node when said sender node m is not the same as the current up-link receiver side relay node of own node or $n = m$; and

step of transmitting the new route setting packet containing said metric Mn as a new metric M, sender node

identification information indicating identification information of own node and said up-link receiver side relay node information of own node.

123. A program of a relaying method for a radio network including core nodes connected to a wired network, relay nodes each relaying at least one of a down-link data packet initially transmitted from said core node and an up-link data packet directed toward said core node, and a terminal station capable of transmission and reception of data packet with both of said core node and said relay node, said program being executed by a computer for implementing the step of:

selecting said relay node having total path loss to be minimum at least one of between relay nodes includes in a relay route of said data packet and between said relay node and said core node.

124. A program of a relaying method for a radio network including cores node connected to a wired network, relay nodes each relaying at least one of a down-link data packet initially transmitted from said core node and an up-link data packet directed toward said core node, and a terminal station capable of transmission and reception of data packet with both of said core node and said relay node, said program being executed by a computer for

implementing the step of:

relaying said up-link data packet to other one of up-link relay node and said core node when the up-link data packet addressed to own node and relaying a down-link data packet to at least one down-link relay node when the down-link data packet address to the own node is received.

125. A program of a relaying method for a radio network including a core node connected to a wired network, relay nodes each relaying at least one of a down-link data packet transmitted from said core node and an up-link data packet directed toward said core node, and a terminal station capable of transmission and reception of data packet with both of said core node and said relay node, said program being executed by a computer for implementing the step of:

step of detecting arrival of a route setting packet including a sender node identification information, an up-link receiver side relay node information and a metric indicative of an amount providing an indicia for selecting the receiver side relay node;

step of making judgment whether said up-link receiver side relay node indicates own node or not upon detection of arrival of said route setting packet;

step of recording a node indicated by said sender node

identification information contained in said route setting packet in a relay node list when judgment is made that said up-link receiver side information indicates own node;

step of taking a measured path loss upon judgment that said up-link receiver side node relay node information does not indicative own node, as path loss Ln (n is unique number of a sender node of said route setting packet) between the node transmitting said route setting packet and the own node;

step of reading the metric Mr.n contained in said route setting packet;

step of calculating and storing an update metric from said transmission loss Ln and said metric Mr.n;

step of comparing said update metric Mn with the update metric corresponding to the route setting packet received in the past for making judgment whether the update metric Mn is minimum;

step of setting said update metric Mn to a metric contained in the metric of said route setting packet and registering the node indicated by said sender node identification information of the currently arrived route setting packet as said up-link receiver side relay node when said update metric Mn is judged as minimum; and

step of transmitting a route setting packet containing said transmission metric M as said metric, sender node

identification information indicating identification information of own node and said up-link receiver side relay node information.

126. A program of a relaying method for a radio network including a core node connected to a wired network, relay nodes each relaying at least one of a down-link data packet transmitted from said core node and an up-link data packet directed toward said core node, and a terminal station capable of transmission and reception of data packet with both of said core node and said relay node, said program being executed by a computer for implementing the step of:

step of detecting arrival of a route setting packet including a sender node identification information, an up-link receiver side relay node information and a metric indicative of an amount providing an indicia for selecting the receiver side relay node;

step of making judgment whether said up-link receiver side relay node indicates own node or not upon detection of arrival of said route setting packet;

step of recording a node indicated by said sender node identification information contained in said route setting packet in a relay node list when judgment is made that said up-link receiver side information indicates own node;

step of taking a path transmission loss upon judgment that said up-link receiver side node relay node information does not indicative own node, as path loss Ln (n is unique number of a sender node of said route setting packet) between the node transmitting said route setting packet and the own node;

step of reading the metric Mr.n contained in said route setting packet;

step of calculating and storing an update metric from said transmission loss Ln and said metric Mr.n;

step of making judgment whether the sender node identification information contained in the currently received route setting packet matches with the current up-link receiver side relay node information or not;

step of forgetting all stored update metrics when the sender node identification information contained in the currently received route setting packet matches with the current up-link receiver side relay node information;

step of comparing the update metric corresponding to the route setting packet received in the past and the currently obtained update metric Mn when the sender node identification information contained in the currently received route setting packet does not match with the current up-link receiver side relay node information;

step of setting said update metric Mn to a metric contained

in the metric of said route setting packet and registering the node indicated by said sender node identification information of the currently arrived route setting packet as said up-link receiver side relay node when all of said update metrics are forgotten or when said update metric Mn is judged as minimum; and

step of transmitting a route setting packet containing said transmission metric M as said metric, sender node identification information indicating identification information of own node and said up-link receiver side relay node information.

127. A program of a relaying method for a radio network including a core node connected to a wired network, relay nodes each relaying at least one of a down-link data packet transmitted from said core node and an up-link data packet directed toward said core node, and a terminal station capable of transmission and reception of data packet with both of said core node and said relay node, said program being executed by a computer for implementing the step of:

step of detecting arrival of a route setting packet including a sender node identification information, an up-link receiver side relay node information and a metric indicative of an amount providing an indicia for selecting the receiver

side relay node;

step of making judgment whether said up-link receiver side relay node indicates own node or not upon detection of arrival of said route setting packet;

step of recording a node indicated by said sender node identification information contained in said route setting packet in a relay node list when judgment is made that said up-link receiver side information indicates own node;

step of taking a measured path loss upon judgment that said up-link receiver side node relay node information does not indicative own node, as path loss Ln (n is unique number of a sender node of said route setting packet) between the node transmitting said route setting packet and the own node;

step of reading the metric Mr.n contained in said route setting packet;

step of calculating and storing an update metric from said transmission loss Ln and said metric Mr.n;

step of comparing said update metric Mn with the update metric corresponding to the route setting packet received in the past for determining a sender node m (m is unique number of node) having minimum metric;

step of making judgment whether said sender node m is the same as the current up-link receiver side relay node and $n \neq m$;

step of setting said update metric Mn to a metric contained in the metric of said route setting packet and registering the node indicated by said sender node m as said up-link receiver side relay node when said sender node m is not the same as the current up-link receiver side relay node or n = m; and

step of transmitting a route setting packet containing said transmission metric M as said metric, sender node identification information indicating identification information of own node and said up-link receiver side relay node information.